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Iron-chelating effect of *Caesalpinia sappan* extract under conditions of iron overload

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**ABSTRACT:** This study aims to obtain the effective dose of sappan wood extract (*Caesalpinia sappan* L.) that serves as a herbal chelating agent. An experiment with a Completely Randomized Design (CRD) was conducted on 21 male rats of 8 weeks old. The rats were given oral iron dextran and sappan wood extract at different doses for 15 days. Iron-related blood parameters were measured. The result revealed that a sappan wood extract dose of 200 mg/kg body weight had a chelating effect, showing a decline in ferritin levels (55.6%), a reduction in serum iron levels by 60%, and a reduction in transferrin saturation levels (84.7%). We also found an increase in transferrin levels (66.2%), and TIBC levels (62%) compared with rats given iron dextran injection alone. In conclusion, our study showed that a sappan wood extract dose of 200 mg/kg body weight has an ability to chelate excess iron in rats under conditions of iron overload.

1 **INTRODUCTION**

Thalassemia is a hereditary disease characterized by disturbances in the chain synthesis of hemoglobin or globin chains (Guyatt et al., 1990). The red blood cells in patients with thalassemia are short-lived, only about 1–2 months, so that the production of red blood cells is unbalanced and causes anemia due to impaired production of hemoglobin. In order to overcome this thalassemia, patients receive blood transfusions continuously. There is no process to remove excess iron in the body, which can be toxic (Guyatt et al., 1992).

An iron chelator is needed in patients with thalassemia to deal with the excess iron in the body. Iron chelator is a chelating agent that can bind to excess iron and then excrete them from the body (Aleem et al., 2014). Iron chelators that are commonly used by patients with thalassemia are Deferoxamine (Desferal), Deferiprone, and Deferasirox. Deferiprone and Deferasirox are active iron-binding agents when given orally. However, Deferoxamine medication is not convenient for patients with thalassemia, as it is given by subcutaneous infusion (below skin).

Deferoxamine medication often causes pain in patients with thalassemia, especially children, and hence, the compliance is low and it is quite difficult to apply. The other oral chelators such as Deferiprone and Deferasirox are rated impractical, uncomfortable, and are very expensive.

Sappan wood (*Caesalpinia sappan* L.; Secang) is a plant that has high flavonoid content, which may be potential as a natural iron chelator of herbal origin. Organic components such as flavonoids may function as a metal chelator for their one-carboxyl group and an adjacent phenolic group reacts with metal ions to form a stable complex (Aleem et al., 2014).

In this study, the sappan wood extract was given at doses of 100, 200, and 400 mg/kg body weight to see the chelation ability of iron compared with another chelator, Deferiprone at a dose of 75 mg/kg body weight. The aim of this study is to investigate the potential role of sappan wood extract as an iron-chelating agent in rats (*Rattus norvegicus* L.) with excess iron condition. We proposed sappan wood extract as an iron chelator for patients with thalassemia.